

Application Serial No: 10/712,770
Responsive to the Office Action mailed on: June 12, 2008

REMARKS

This Amendment is in response to the Office Action mailed on June 12, 2008. Claims 18-24 are amended editorially. Claim 39 is new and is supported, for example, in the specification at page 24, line 32-page 25, line 13. No new matter is added. Claims 3-16, 18-24, 29-32, 36 and 39 are pending.

§103 Rejections:

Claims 3-12, 14-16, 29-32 and 36 are rejected as being unpatentable over Iizuka (US Patent No. 6,686,960) in view of Ikeda (US Patent No. 6,423,959). This rejection is traversed.

In general, a solid-state image sensing device, including the present invention and both the Iizuka and Ikeda references, performs four fundamental operations in order:

- (1) a first operation of reading out signal charges from pixels to vertical transfer parts;
- (2) a second operation of vertically transferring the read out signal charges in the vertical transfer parts;
- (3) a third operation of a horizontal transfer part receiving the signal charges from the vertical transfer parts; and
- (4) a fourth operation of horizontally transferring the received signal charges in the horizontal transfer part.

Thus, a configuration of the vertical transfer parts is not equal to a configuration of the horizontal transfer part, and it is not possible to perform operations (1) and (2) after performing operations (3) and (4).

Specifically, claim 3 requires, among other features, that the first pixel mixture groups each are composed of $2n+1$ (n denotes an integer of 1 or higher) pixels arranged at every other pixel in a horizontal direction (i.e. the row direction) of the bidimensionally arranged pixels, and the second pixel mixture groups each are composed of $2n+1$ pixels that are arranged at every other pixel and are pixels other than those of the first pixel mixture groups in the horizontal direction (i.e. the row direction) of the bidimensionally arranged pixels, with centers of gravity of the pixels of the respective second pixel

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mixture groups each being located at an equal distance from centers of gravity of the pixels of two first pixel mixture groups adjacent thereto.

These features are directly related to operations (3) and (4) discussed above. For example, as shown in Figure 2 and described in the present application at page 18, line 30-page 19, line 9, for the case where n equals 1 a first pixel mixture group is formed with three green pixels G11, G12 and G13 in the horizontal direction (i.e. the row direction) of the bidimensionally arranged pixels, and a second pixel mixture group is formed with three blue pixels B11, B12 and B13 in the horizontal direction (i.e. the row direction) of the bidimensionally arranged pixels which are the same horizontal direction (i.e. the row direction) including the three green pixels G11, G12 and G13 of the first pixel mixture group. Thus, among the pixels of two different colors located alternately in the horizontal direction (i.e. the row direction), each of the three pixels arranged at every other pixel are combined to be mixed together and thereby the centers of gravity of pixels of each color mixed are spaced equally, thereby avoiding the formation of moiré and aliasing.

The combination of Iizuka and Ikeda does not teach or suggest these features. In contrast, column 19, lines 3-27 and Figures 16 and 17 of Ikeda, relied upon by the current rejection, teaches that "the charge transfer method of FIG. 16, charge is read from every second row of the photoelectric converters 3 arranged in the column direction (i.e. the vertical direction) and is fed to the vertical charge transfer path 5" and "FIG. 17 shows a charge transfer method in which charge is read from every second row of the photoelectric converters 3 arranged in the column direction (i.e. the vertical direction). The charge is transferred eight transfer stages 41 through the vertical path 5 by each transfer operation". Accordingly, these features of Ikeda are generally directed to operations (1) and (2) discussed above and are silent on operations (3) and (4).

Iizuka teaches that "when the addition of signal charges in the vertical direction (i.e. the column direction) is performed by the vertical CCD registers 4...so that signal charges $G11+G31$, $R12+R32$, $G13+G33$, $R14+R34$, $G15+G35$, $R16+R36$ are obtained," (See column 18, lines 53-60 and Figure 19 of Iizuka). Similarly to Ikeda, the cited portion of Iizuka is only directed to operations (1) and (2) and is silent on operations (3) and (4). Thus, combining the $2n+1$ pixel mixture groups of Ikeda to the invention of

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Iizuka only pertains to the arrangement of pixels in the column direction (i.e. the vertical direction).

Otherwise stated, even if Ikeda teaches first and second pixel mixture groups each containing $2n + 1$ pixels, Ikeda only teaches pixel mixture groups composed of plural pixels arranged in the column direction (i.e. the vertical direction). Neither Ikeda nor Iizuka teach or suggest that both the first and second pixel mixture groups are composed of plural pixels arranged in the horizontal direction (i.e. the row direction), as required by claim 3. Moreover, since the pixel group in Ikeda and the pixel group of Iizuka is composed of plural pixels arranged in the vertical direction, it is impossible for pixels of two different colors to be located alternately in the horizontal direction (i.e. the row direction), as required by claim 3.

Claim 29 is directed to a solid-state image sensing device that requires, among other features, an operation mode that can be switched selectively between at least two modes including a mode of mixing m_1 pixels arranged horizontally of the bidimensionally arranged pixels and a mode of mixing m_2 pixels arranged horizontally of the bidimensionally arranged pixels, where the integer m indicates a common multiple of m_1 (m_1 denotes an integer of 2 or higher) and m_2 (m_2 denotes an integer of 2 or higher).

The combination of Iizuka and Ikeda does not teach or suggest these features. Similarly to claim 3, the above features of claim 29 are generally directed to operation (3) of a horizontal transfer part receiving the signal charges from the vertical transfer parts and operation (4) of horizontally transferring the received signal charges in the horizontal transfer part (i.e., arranging charges in the horizontal transfer part). In contrast, Figures 12 and 14 of Ikeda, relied upon by the current rejection as teaching at least two modes including a mode of mixing m_1 pixels arranged horizontally and a mode of mixing m_2 pixels arranged horizontally, merely teach a mode in which charge arranged in a vertical direction is mixed together. Thus, charge ranging from y_{n+7} to y_n is directed to operation (1) of reading out signal charges from pixels to vertical transfer parts and operation (2) of vertically transferring the read out signal charges in the vertical transfer parts (i.e., arranging charges in the vertical transfer parts). Nowhere does Ikeda teach or suggest a mode of mixing m_1 pixels arranged horizontally and a mode of mixing m_2

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pixels arranged horizontally as Ikeda is silent as to how charges are arranged in the horizontal transfer part. Iizuka does not overcome these deficiencies of Ikeda as Iizuka is also silent as to how charges are arranged in the horizontal transfer part.

Claim 13 is rejected as being unpatentable over Iizuka in view of Ikeda and further in view of Uya (US Patent No. 7,199,826). This rejection is traversed. Claim 13 depends from claim 3 and is allowable for at least the same reasons discussed above. Applicants do not concede the correctness of this rejection.

Conclusion:

Applicants respectfully assert that claims 3-16, 18-24, 29-32, 36 and 39 are in condition for allowance. If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, Douglas P. Mueller (Reg. No. 30,300), at (612) 455-3804.



Dated: October 14, 2008

Respectfully submitted,

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